

Remarks

In the Office Action of September 8, 2004, the Patent Office rejected claims 1-11 and 13-21. Claim 12 was previously canceled. Herein, Applicant has amended claims 1, 3, 7 and 21. Claims 1-11 and 13-21 are presented herein, the reexamination and reconsideration of which are respectfully requested.

The Patent Office has rejected all of the claims 1-11 and 13-21 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,155,386 ("Hirai et al.") in view of U.S. Patent No. 1,756,907 ("Payne"). Applicants respectfully disagree with the rejection for the following reasons.

A. Payne and Hirai et al Fail To Teach Recesses and Plateaus That Are Dimensioned to Mate, As Required By Claims 1 and 7

To establish a *prima facie* case of obviousness, all of the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

With respect to independent claims 1 and 7, directed to a braking system apparatus, claim 1 recites:

A braking system for a shaft mounted for rotation, the braking system comprising:

a brake disc ... including a disc face having a plurality of disc plateaus ...

a brake plate ... including a plate face positioned substantially parallel and adjacent to the disc face and including a plurality of plate plateaus corresponding to the number of disc plateaus, ... **the plate plateaus defining recesses between consecutive plate plateaus that are dimensioned to correspond to the disc plateaus such that the disc plateaus mate with the recesses ...**

(emphasis added).

Independent claim 7 recites:

A braking system for braking a rotatable shaft, the system comprising:

a brake plate moveable between an engaged position and a retracted position, the brake plate including a plate face having a plurality of plate plateaus ...

a brake disc mounted to the shaft for rotation relative to the brake plate, the brake disc including a disc face positioned substantially parallel and adjacent to the plate face and including a plurality of disc plateaus, ... **the disc plateaus defining recesses between consecutive disc plateaus that are dimensioned to**

correspond to the plate plateaus such that the plate plateaus mate with the recesses...

(emphasis added).

Assuming *arguendo* that the Hirai et al. or Payne references would have been obvious to combine, such a combination would fail to yield the invention claimed in independent claims 1 and 7 because Hirai et al. and Payne fail to teach all of the claimed features. In particular, the references fail to teach the matable plateaus and recesses as indicated in the above highlighted language of claims 1 and 7.

The Patent Office admits that “Hirai et al. lacks the teaching of the plurality of plateaus and recesses on both the brake disk and brake plate.” (Office Action dated Sep. 8, 2004, page 2, paragraph 2). The Patent Office merely concludes:

It would have been obvious to one having ordinary skill in the art at the time of the invention to have provided the contacting disc and plate surfaces of Hirai et al. with the plurality of plateaus and recesses as taught by Payne in order to positively lock the plate to the disc in order to prevent further relative motion.

(Office Action dated Sep. 8, 2004, pp. 2-3, paragraph 2).

Applicant respectfully disagrees. Payne fails to teach a structure in which corresponding plateaus and recesses on respective discs are dimensioned to mate. Payne teaches an electromagnetic clutch in which opposing plates contain grooved “torque producing areas” B1, B2, D1, D2. Payne explains that these “torque producing areas” are not interlocking or mating. Rather, the grooves in Payne are provided “in order to increase the carrying capacity of the lines of [magnetic] force at their engaging edges.” (See, Payne, p. 2, col. 1, lines 19-21). Thus, Payne teaches to the contrary of the rejected claims that the circumferential pressure rings E and F (See Fig. 1) **prevent** the grooves and projections from mating, as expressly claimed in claims 1 and 7. Specifically, Payne states:

By reason of the separate pressure surfaces E and F it becomes possible to place the grooves **quite close together** as shown in the enlarged views in Figures 3, 4 and 5, and to make their mean width somewhat greater than that of the intervening tooth projections **without danger of interlocking or of too great wear on the engaging faces of the poles.**

Payne, p. 2, col. 1, lines 21-29 (emphasis added). In the device taught by Payne, by design, any contact between the “torque producing areas” B1, B2 and D1, D2 occurs only on their

peak surfaces as shown in Figs. 3-5, not on the angled recessed portions. The pressure rings E and F render it structurally impossible for the grooved torque producing areas B1, B2 and D1, D2 to mate. Moreover, as can be seen in FIG. 5 of Payne, the top surfaces of the grooves are significantly wider than the bottom surfaces, thus, the torque producing areas are not shaped to correspondingly mate in any case. Thus, the unmamateable type of grooves taught by Payne, even if combined with the features of Hirai, would not yield the structure claimed in claims 1 and 7.

In view of the foregoing, the Payne and Hirai references fail to teach or suggest key features of independent claims 1 and 7. Therefore, Applicant respectfully submits that the Patent Office has failed to establish a *prima facia* case of obviousness of claims 1 and 7 based upon the prior art as required by 35 U.S.C. §103, and the rejection should be withdrawn.

B. Payne Teaches Away From A Combination That Would Yield The Mated Recesses and Plateaus Of Claims 1 and 7

The Patent Office fails to appreciate that Payne and Hirai lack any suggestion for the proposed combination. Moreover, Payne teaches directly away from a combination that would yield the claimed features, and accordingly, one of ordinary skill in the art would not have been motivated to combine the alleged teachings of Hirai et al and Payne so as to arrive at the present invention. In order to establish a proper obviousness rejection under 35 U.S.C. § 103 (a) based on a combination of prior art, the Patent Office must show some motivation, suggestion, or teaching to make the specific combination claimed by the Applicant. *In re Kotzab*, 217 F.3d 1365 (Fed. Cir. 2000), citing *In re Dance*, 160 F.3d 1339, 1343 (Fed Cir. 1998). Here, the Patent Office fails to cite any suggestion, motivation, or teaching in the art for the proposed combination.

As discussed above, Payne, directed to a magnetic clutch, teaches grooves and projections for the purpose of increasing magnetic force fields. Payne fails to suggest that grooves and projections should be dimensioned to be physically locked, and this reference fails even to suggest that grooves and projections could be used outside of a magnetic clutch application. Furthermore, because Payne teaches that interlocking between plates should be avoided and physically prevented, as discussed above, Payne expressly teaches away from a combination that would yield a matable relationship between the plateaus and recesses as claimed in claims 1 and 7 of the present application.

As a result, one of ordinary skill in the art at the time of the invention would not have been motivated to combine the alleged teachings of Payne and Hirai in an effort to achieve

the invention of claims 1 and 7. For this further reason, the Patent Office's rejection of claims 1 and 7 should be withdrawn accordingly.

C. The References Relied On By The Patent Office Fail To Teach The Degree Of Ramp Incline Required By Claims 2, 4-7, 11, 14 & 21

Independent claim 7 and dependent claims 2, 4-6, 11, 14, and 21 require specific angles of ramp surfaces. Such features are not taught or suggested by either Hirai et al. or Payne. Specifically, claims 2, 4-7, 11, 14 and 21 contain limitations relating to the degree of incline of ramp structures, as follows:

- Claim 2: "the disc ramp is angled approximately 10° relative to the disc face"
- Claim 4: "the disc ramp is angled approximately 10° relative to the disc face"
- Claim 5: "the plate ramp is angled approximately 10° relative to the plate face"
- Claim 6: "the disc ramp is angled at an angle of between approximately 5° and 20°"
- Claim 7: "the disc ramps being angled at an angle of between approximately 5° and 20°"
- Claim 11: "the plate ramps and the disc ramps are angled at approximately 10°"
- Claim 14: "the plate ramps and the disc ramps are angled at approximately 10°"
- Claim 21: "the disc ramps being angled approximately 10° relative to the disc face and the plate ramps being angled approximately 10° relative to the plate face."

Hirai et al fails to teach ramps, and the Patent Office acknowledges that "Payne is silent to the angle of the ramps." Office Action dated Sept. 8, 2004, ¶ 2, p. 3. Referring to the Figures of Payne, particularly FIG. 5, the sides of torque producing areas lie at an angle significantly greater than 10°. The hexagonal geometry formed by the oppositely aligned grooves as shown in FIG. 3 of Payne teaches that the angle is about 60°.

In view of the foregoing, the Payne and Hirai references fail to teach or suggest the ramp angles with respect to a disc or plate face as recited in claims 2, 4-7, 11, 14, and 21. Therefore, Applicant respectfully submits that the Patent Office has failed to establish a *prima facia* case of obviousness of claims 2, 4-7, 11, 14, and 21 based upon the prior art, and the rejection should be withdrawn.

D. The Ramp Incline Angle In Claims 2, 4-7, & 21 Would Not Have Been An Obvious Design Choice

The Patent Office acknowledges that Payne is silent as to the angle of the ramps (Office Action dated Sept 8, 2004, p. 3, first full paragraph), but nevertheless concludes that

the claimed angles would have been a mere design choice based on the materials used and the force desired to be absorbed by the ramps. (Office Action of Sept. 8, 2004, ¶2, p. 3). The Patent Office notes that “it would have been obvious to make the ramp angles 10 degrees since it has been held that where the general conditions of a claim are disclosed in the art, discovering the optimum or workable ranges involves only routine skill in the art.” (*Id.*, citing *In re Aller*, 105 USPQ 233).

Firstly, deficiencies of references cannot be saved by appeals to “common sense” and “basic knowledge” without any evidentiary support. *In re Zurko*, 258 F.3d 1379 (Fed. Cir. 2001). Applicant respectfully points out that the Patent Office has shown no evidentiary support for his argument that the angle of the disc ramp was merely a design choice.

Secondly, even on the alleged grounds of rejection stated by the Patent Office, the rejection is improper because the Patent Office has failed to establish that the “general conditions” of claims 2, 4-7, 11, 14, and 21 have been disclosed in the art. The claimed ramp angles are not arbitrary. Rather, the purpose of the claimed angles is directly related to the claimed recesses and plateaus, such that the angles have been selected so as to permit the ramps to ride along one another as the corresponding recesses and plateaus discs seat or unseat upon rotation of the engaged disc and plate. (See, Spec., p. 4, lines 1-10, p. 4, line 24 through p. 5, line 4). The approximate 10° angle of the disc ramp was selected for the purpose of allowing dynamic engagement of the plateaus at high speed without damage. If the angle is too shallow, the brake plate under vibration will creep up the disc ramps, causing the braking system to fail in high vibration environments. If the angle is too steep, the plateaus of the brake plate will be damaged due to the high impact loading thereon originating from the high speed engagement with the disc plateaus. Therefore, the disc ramp angled approximately 10° relative to the disc face is not obvious because it must achieve the dual function of high-speed dynamic engagement without damage and holding under continuous high torque simultaneously with applied vibration. Since the areas B1, B2 and D1, D2 of Payne do not interlock or mate with grooves W defined between the areas, the disclosure of Payne is unrelated to the claimed invention and a feature that is based on dynamic engagement would not be obvious from the disclosure of Payne.

One can not merely say that a dynamic engagement feature is obvious in view of an unrelated art that actually teaches away from dynamic engagement. As explained above in connection with claims 1 and 7, the Patent Office has failed to cite a teaching in the prior art of a mated engagement between corresponding recesses and plateaus of an opposed brake

disc and brake plate, and the Patent Office has failed to cite a suggestion or teaching that would have motivated one of ordinary skill in the art provide an interlocking structure. The claimed ramps associated with the claimed plateaus and recesses are yet further removed from the teachings of the art.

In other words, the Patent Office has failed to cite any teaching or suggestion in the prior art of ramps that function as the ramps of the present invention, and it follows that one of ordinary skill in the art would not have been motivated to design the ramps of the claimed invention in the first place. Therefore, the claimed ramp angle cannot be dismissed under §103 as a mere “design choice” and the rejection of claims 2, 4-7, 11, 14, and 21 on this basis should be withdrawn.

E. Payne and Hirai et al Fail To Teach The Features of Claims 15

Independent claim 15 recites:

A method of braking a rotating shaft, the method comprising:

attaching the shaft to a brake disc, the brake disc having a disc face with shallow disc plateaus protruding from it; and

providing a brake plate with a plate face and a spring force to selectively engage the plate face of the brake plate with the disc face of the brake disc, the plate face having shallow plate plateaus protruding from it, the spring force being chosen to permit the disc plateaus to slide over the plate plateaus in a dynamic braking portion of the method and prevent sliding of the disc plateaus over the plate plateaus in a locking portion of the method.

Claim 15 requires a spring force chosen to selectively engage the brake plate and disc face to permit or to prevent sliding. The Patent Office has cited no teaching of such a feature in either Hirai et al or Payne. For the reasons set forth above in Sections VII (A) and (B) in connection with claims 1 and 7, the alleged teachings of Payne and Hirai et al fail to teach engageable plateaus and recesses. The additional method feature of providing a spring force operable for dynamic engagement in the manner claimed in claim 15 is unique. Accordingly, the Patent Office has failed to establish a *prima facie* case of obviousness with respect to claim 15, and the rejection of this claim should be withdrawn.

F. The Claims are Patentable Over GB 2 114 689 A

In a Supplemental Information Disclosure Statement submitted concurrently herewith, Applicant has submitted references identified in a search report from a corresponding UK application. The search report cites GB 2 114 689 A (“Marshall”), among various references.

Applicant submits that the claims of the present application are patentable over Marshall. Marshall teaches conventional ratchet structures used for high-torque spanners or wrenches. Marshall fails to teach or suggest a structure or method for braking as claimed in the present application. Marshall fails to teach the plateau and ramp configuration required by claims of the present application. Accordingly, Applicant respectfully requests an acknowledgement of consideration of all prior art references, including Marshall, and a prompt indication of allowability of claims 1-11 and 13-21 presented herein.

Conclusion

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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